

Ulcers in trachoma usually heal on atropine, cessation of copper treatments for a time, removal of trichiasis, and a few applications of trichloroacetic acid. Ultra-violet irradiation has also proved useful in this type of ulcer. Anyone who has lived in a trachomatous country, however, has seen occasional cases in which a number of small infiltrates arise simultaneously at the edges of the pannus and fuse rapidly to form a ring ulcer. Such an ulcer, when treated by the usual measures, results in almost complete opacity of the whole central cornea. I have seen a number of these heal with keratotomy and report a typical case.

Mark H—, a man of 60, had been treated for trachoma for 12 years. The lids had apparently completely healed 18 months before. According to his ophthalmologist, the right eye had developed a ring ulcer which required enucleation after three months. When seen by me, the left eye had shown ulceration for six days. A ring of infiltration surrounded the cornea except for an area above the centre, 3 mm. long. About 5 mm. of the central cornea was not ulcerated but was very hazy. Vision was, counting fingers at 2 feet. Keratotomy was performed at once at the central border

of the infiltrated area nearest the outer limbus. This was kept open for nine days when the central cornea had cleared and the infiltration seemed to have stopped. The cut was allowed to close, but a new infiltration promptly appeared near the lower limbus, so a new opening was made here and kept open seven days, when the ulcer no longer stained with fluorescein. There has been no recurrence and vision one year later was 20/25.

It is difficult to summarize these random remarks, I may only emphasize once more the importance of prompt action in cases of corneal infection. An ulcer may be easily sterilized when it is very small by direct application of antiseptics, but not so easily if one waits till it is large and deep. When the deeper layers of the cornea are invaded the best thing that can be done is to aid the eye's defences by opening the anterior chamber. Delimiting keratotomy, when carefully performed, is a safe and effective way of doing this, and allows a repeated reopening of the incision till healing is assured.

#### REFERENCES

1. GRADLE, H. S. AND GIFFORD, S. R.: Delimiting keratotomy, *Tr. Am. Acad. of Ophth. & Oto-Laryngol.*, 1933, 38: 120.
2. GIFFORD, S. R.: Rodent or Mooren's ulcer of cornea, *Arch. Ophth.*, 1933, 10: 800.

## THE VALUE OF MAGNESIUM CHLORIDE AS AN AID IN THE TREATMENT OF CANCER

### (A PRELIMINARY REPORT)

BY ROBERT H. CRAIG, M.D., F.A.C.S., F.R.C.S.(C.),

*Montreal*

A PATIENT, male, aged 43, consulted me, complaining of a husky voice of eight months' duration. His family history was most unfavourable; his mother, two maternal uncles and an aunt had died of cancer.

Examination of his larynx revealed a warty growth on the anterior third of the right vocal cord, the edges of which were indurated, and there was a small growth on the left vocal cord. The Wassermann test was negative; no evidence of tuberculosis.

The growths were destroyed by electro-dessication with the mono-polar current. Radium treatment was given when the reaction from the dessication had subsided. Five months later the voice was good and the larynx appeared normal, but on account of the family history, in consultation with an eminent radiologist, it was deemed advisable to give him a course of a modified Coutard's x-ray treatment. After the first few treatments a persistent cough developed; they

were therefore discontinued. The cough became very distressing and œdema of the larynx developed with great respiratory embarrassment. Death appeared to be imminent. To relieve the respiratory distress a low tracheotomy was performed, and it was also hoped that by placing the larynx at rest the œdema would subside. Unfortunately, it became worse. An x-ray of the chest showed what appeared to be metastases, and laryngectomy, which had been considered, was rejected. This opinion was confirmed by Dr. G. E. Hodge. On account of the persistent and exhausting cough, painful deglutition, and the septic condition of the patient, as shown by the elevation of temperature, accelerated pulse, the pungent odour from the mouth and tracheotomy wound, a laryngo-fissure was considered to be the only operative procedure advisable.

The operation, under avertin and chloroform anaesthesia, disclosed a diffuse cancerous infiltra-

tion and œdema of the larynx involving the epiglottis, the ary-epiglottidean folds, the arytenoids, the true and false vocal cords, the subglottic space, and the trachea as far down as the tracheotomy wound. The inner surface of the cricoid was denuded of its perichondrium. The laryngeal landmarks were obliterated. Two denuded pieces of cartilage were removed from the larynx,\* and three large foul-smelling sloughs were removed from the subglottic space with forceps and suction. In order to gain free access to the upper part of the trachea the cricoid cartilage was incised with the radon knife and this space carefully fulgurated. A deep ulcerated area on the right side of the larynx was fulgurated. The larynx and trachea were then packed with iodoform gauze saturated with tannic and gallic acid and treated as an open wound. A feeding tube was passed through the nose into the œsophagus to a depth of ten inches.

There was some improvement in his general condition following the operation, which was attributed to the removal of the septic foci, but in spite of daily dressings and meticulous care, the laryngeal picture remained about stationary. The patient's condition was grave and the prognosis gloomy. As a last resort I decided to administer magnesium chloride subcutaneously and to use it combined with pepsin as a spray for the pharynx, with pepsin and glycerine as a dressing in the laryngeal cavity. After the first injection the patient stated that his teeth felt "as if they were steel". Daily examination of the larynx through the laryngeal mirror showed a gradual disappearance of the œdema of the epiglottis and larynx. The infiltration began to subside after the tenth treatment. After two weeks of the treatment the skin looked white and almost chalky, and the patient no longer appeared septic. The mucous membrane of the pharynx was whitish, and that of the epiglottis and larynx was white and glistening, suggestive of the deposition of the magnesium salt in the tissues. The tracheotomy wound, which had been moth-eaten and succulent in appearance, was now firm and healthy-looking; the granulations in the laryngeal opening were white, healthy and glistening. The odour and cough had almost disappeared. The improvement was pronounced, and, in order if possible to speed it up, I prescribed magnesium chloride by mouth.

\* The pathologist reported the necrotic tissue removed from larynx as containing carcinoma cells.

Two days later the man developed general malaise, with loss of appetite, and the tracheotomy wound had lost its healthy appearance. The magnesium chloride was discontinued and a calomel purge given. Forty-eight hours later he again felt comfortable, and the appearance of the mucosa of the larynx and the tracheotomy wound gave the clue to the amount of magnesium chloride that could be tolerated and assimilated by the patient. Fifteen days after the treatment was begun the feeding tube was removed and deglutition gradually returned to normal. One month later the œdema had disappeared from the epiglottis and the ulceration of the mucous membrane of the larynx had disappeared. When the tracheotomy tube was removed the patient could whisper; abduction and adduction were slowly returning. One month and two days from the time the treatment was first started the patient left the hospital. At the time of writing, two months later, he has gained over fifteen pounds, his appetite is excellent, and the tracheotomy opening healthy, but the larynx is almost immobile. I attribute this fixation partly to the fact that during the time I was absent on my vacation he was not encouraged, nor did he attempt to use his voice. I hope to overcome this by ionization and suitable dilatation. He comes to my office thrice weekly, driving his own car, and is well enough to supervise his business for a part of the day.

The lead to find an antidote for cancer has baffled the scientific world for many years. Numerous antitoxins and preparations have been tried, but up to the present time, apart from surgery, electro-therapeutics and radiology, no specific remedy had been found to combat this universal scourge.

The importance of the bio-chemical approach to the study of cancer has been fully stressed by Prof. Pierre Delbet, Superintendent of the Cancer Institute, Hôpital Cochin, Paris. The *Stockholm Weekly Journal*, in June, 1931, published a most enlightening article by him, the title of which was "Take magnesium and escape cancer". Here he advocated as a prophylactic measure the administration of magnesium to all persons in and past middle life. By his experimental work he showed that soil, water and food stuffs deficient in magnesium salts predisposed to cancer. In order to check up his gross findings he inoculated a series of rabbits with cancer virus. Fifty per cent of these he treated with

magnesium chloride, all of which recovered, while the majority of the untreated rabbits died.

Apart from Delbet's findings there are many fundamental biological reasons why magnesium chloride should have been chosen. Firstly, the kinship of mankind and plants. This may be exemplified by the spectroscope, by which it is found that while porphyrin is the base of red blood cells it is also the base of the green colouring matter in plants. The two porphyrins differ mainly in that the blood porphyrin is combined with iron while the plant porphyrin is combined with magnesium. Dr. Colvin Coulter, of Columbia University, found further evidence of this kinship in porphyrin which he extracted from cytochrome, a pink pigment existing in the cells of virtually all those living things which use oxygen. This cytochrome, he finds, is combined with magnesium, so that a porphyrin-magnesium combination is not an exclusive patent of the chlorophyll green plants but belongs also to the red-blooded races. Parsons<sup>1</sup> in his book "Fundamentals of Biochemistry" says "Not only hæmoglobin but many other animal pigments are porphyrin derivatives, as are also cytochrome and several other of the oxidation catalysts of the cell. So also is chlorophyll which is responsible for the photo-synthetic activities of green plants. It seems as if during the course of evolution the same piece of chemical structure had been utilized for a variety of very different functions".

Secondly, according to the latest views, magnesium exhibits its maximum valence in combination with chlorine. Magnesium chloride is the ideal oxidizing and reducing agent in the tissues. This combination has apparently been selected by nature to stimulate to the maximum inter- and intra-cellular change. The great versatility of this combination to reduce and oxidize brings about a complete ionization, and therefore a normal functioning of the cells.

Ionization is one of the greatest forces of nature and demonstrates to us the great importance of employing the right dosage and

screenage when radium and x-ray are used in the treatment of disease. The ideal radiation includes a rest period, as witnessed by the ionization of the earth by the sun during the day, the night supplying the period of rest. The lesson to be learned from this is that too constant and too heavy radiation should be carefully avoided, otherwise it will defeat its purpose, namely that of restoring the normal electric tension and equilibrium of the cells. According to the latest authorities, all metals are in a constant state of ionization, and this constant interchange between the electro-positive and electro-negative forces is essential to the maintenance of life. Every cell in our body is electrically charged, and as long as oxidation and reduction are not interfered with, the health of the body will be maintained. The versatility of the ions in this process is a most fascinating study, and reveals hitherto undreamed of secrets of nature. Further, in a broader sense, nature employs oxidizing and reducing agents to purify the air, the soil, and the water, as well as our bodies. The sun's rays ionize the earth, charging it with electricity, thus maintaining a normal balance between the solid, fluid and gaseous elements.

The significance of the electro-chemical laws and their practical application in medical therapeutics have opened up new vistas of thought, and give one a broader conception of life in all its various processes. After all we are only the microcosm of the macrocosm, and when we are no longer able to receive the electrical charge from the Cosmos "we are changed in the twinkling of an eye" and proceed onward and upward into the Universe of Light—"The things which are not seen are eternal".<sup>2</sup>

No report of this case would be complete without acknowledging my great indebtedness to Dr. George Little and Dr. Herbert Ross, whose cooperation and assistance were invaluable and to Mr. R. King, the assistant pharmacologist at the Western Division of the Montreal General Hospital.

#### REFERENCES

1. PARSONS: Fundamentals of Biochemistry, p. 308.
2. 2. Corinthians, Chap. 4, verse 18.

